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CENTRAL INTELLIGENCE AGENCY
Directorate of Intelligence
Imagery Analysis Service

IMPACT OF A NEAR-REAL-TIME COLLECTION SYSTEM
ON CIA'S IMAGERY ANALYSIS NEEDS

A Preliminary Study By the
Imagery Analysis Service

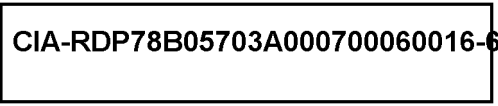
December 1969

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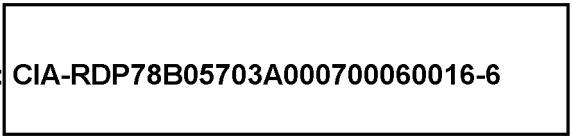
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OBJECTIVE

To meet CIA's needs for imagery analysis during the forthcoming era of highly advanced reconnaissance sensors including a near-real-time imaging satellite system.

ASSUMPTIONS

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I. WHAT IS IMAGERY ANALYSIS?

1. By 1974 imagery analysis will have come of age in CIA, so to speak, having developed for some 21 years since the original P.I. component was formed late in 1952. Over the years, however, imagery analysis has not been adequately defined or understood in spite of its increasingly valued role in intelligence.

2. Imagery analysis is an intelligence analysis activity which utilizes overhead photography and other imagery as its primary source material and supports the production of finished intelligence. Imagery analysis is not finished intelligence, nor is it merely processing of a raw intelligence source. It lies somewhere between the two. It draws on a variety of technical skills as well as specialized substantive or geographic knowledge. At its best, it provides the timely analysis and reporting of conditions and events of intelligence significance, for subsequent all-source evaluation and analysis.

3. What makes the modern-day P.I. a professional "Photographic Intelligence Officer" or "Imagery Analyst," as he is now described? As in the past, his initial task is to interpret or translate photographic information into a form which can be readily understood and used by others. In this he is not unlike a cryptanalyst or translator, even though he works with photography while the others work with signals. To fulfill his responsibilities, the modern-day imagery analyst must be trained and equipped to use complex, high-performance optical instruments to extract and interpret the maximum information imaged. Some photointerpretation functions could perhaps be done by machine (e.g., a cloud scanner, or a target recognition device), although probably at great expense. But beyond these are other functions which cannot be automated. These involve the uniquely human abilities of a trained professional to react to an infinite variety of situations, using photographic information stored in his mind as well as his files. He reacts by analyzing the imagery, applying logic and experience and drawing conclusions. When imagery is the primary or most important source of intelligence in a given situation, then the role of the imagery analyst becomes much like the role of the intelligence production analyst. Yet it is not a role which can be taken on by analysts who are not trained and not in constant practice. The ability to identify the meaning of small tonal changes within an image requires considerable

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experience and, despite the use of specialized optical devices, in the final analysis the eye and mind of the expert are the sensors which must recognize and react. The professional imagery analyst knows his subject matter and can apply the information he derives from imagery to broader intelligence problems. Inevitably then, as he gains experience, he becomes in effect an intelligence analyst using imagery.

4. Maintaining and further developing a corps of professional imagery analysts such as we have described is no easy task. It calls for selection and training specifically designed to develop analysts who can give substance and meaning to the great volumes of imagery acquired and who can use their information, files, and experience to draw conclusions about its significance. To hold these people and maintain their productivity, opportunities for them to advance and improve themselves have to be provided within the framework of a career development program attuned to their particular needs.

5. An understanding of imagery analysis as a professional research and reporting activity, with the characteristics and attending needs we have described above, should be regarded as an important step in planning for exploitation in the NRT era.

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II. HOW DOES IAS MEET CIA'S DEPARTMENTAL IMAGERY ANALYSIS NEEDS?

6. CIA's independent needs for imagery analysis--those needs not satisfied by interagency exploitation efforts under the National Tasking Plan--are currently being satisfied primarily by the DDI Imagery Analysis Service. The bulk of these needs for imagery analysis and related services exist in the production offices of the DDI and DDS&T, where finished intelligence is generated. IAS supports the special projects and studies of these offices, assists in the preliminary assessment of the intelligence content of newly collected imagery, makes independent evaluations of imagery on critical intelligence questions, and develops and tests hypotheses and new exploitation techniques. IAS also meets the needs of DDP operations requiring imagery analysis support, and provides assistance overseas. During FY 1969, IAS performed some 55 percent of its work for DDI offices (primarily OSR and OER), 21 percent for DDS&T (primarily OSI and FMSAC), and about 6 percent for DDP, with 10 percent distributed among DCI, ONE, NIPE, and other consumers. In addition, IAS contributed 8 percent of its effort to the COMIREX inter-agency exploitation program, on behalf of CIA.

7. CIA's departmental imagery analysis needs are presently being met by a CIA component separate from NPIC, so as to assure this Agency and the DCI of the following:

a. An Independent View. "(CIA) must support the Director of Central Intelligence, developing its own positions and contributions over a broad range of critical intelligence problems.... In this intelligence role, Agency production components receive direct support from the Imagery Analysis Service..." Guidelines for the CIA Imagery Exploitation Requirements and Reporting Process.) The need for an independent view is greatest during crisis periods or when critical issues are at stake.

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b. A Second Look. The information content of imagery currently being collected is so high, and the demands placed on the NPIC imagery analysts for immediate reporting on a growing list of targets are so great, that there must be a "second look" to insure complete, accurate, and timely reporting. This second look by IAS consistently yields

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important new intelligence information. During FY 1969 IAS analysts made the initial identification of numerous single-silo ICBM sites, a number of SA-5 complexes, a major new nuclear target, and countless other contributions to the accuracy and timeliness of this readout. Discoveries such as these often constitute fresh ground being broken by our analysts at a time when NPIC is under the weight of their first- and second-phase exploitation responsibilities. So as to avoid confusion to the community during this initial readout period, items found by IAS are passed to NPIC for immediate dissemination. The spirited competition generated among imagery analysts on both sides, by IAS exercising this second-look role, helps to insure accuracy and timeliness in reporting.

c. Responsiveness and Flexibility. A small organization, committed almost entirely to supporting CIA, can apply its efforts--and shift them when necessary--according to CIA needs and priorities without impinging on the needs of other agencies or departments. This requires a close working relationship with requesting offices and divisions.

d. Meeting Covert Needs. Imagery analysis support to the clandestine services varies from transportation or area studies for covert operations to providing imagery analysts for duty overseas. This support requires handling of sensitive information within CIA channels exclusively.

e. Experimentation and Innovation. The DDI has directed that IAS conduct research or experimental work in imagery analysis so as to develop and test hypotheses and new exploitation approaches. New imagery analysis methods developed by IAS are already being applied on such problems as submarine production, the vehicle storage practices of Soviet and Chinese ground forces, and standard Soviet industrial, housing, and support structures.

8. The following imagery analysis tasks are typical of recent work done by IAS in response to the imagery analysis needs of CIA components:

a. Analyze or Study in Depth. In-depth analysis of the imagery is the task most often requested in our current requirements. It supplements the interagency program for imagery exploitation on a national basis. Appropriate measurements are routinely provided as an integral part of this in-depth analysis of the imagery by IAS analysts.

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We expect, as we will show later, that this task will fall more and more to IAS and the other departmental imagery analysis organizations as NPIC faces new responsibilities and increasing workloads brought on by the [] NRT programs.

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b. Describe Changes or Activities. Current tasks of this sort supplement the immediate readout and mission indexing performed for the community by NPIC. In the NRT era one can reasonably expect that those doing the initial exploitation will have to report briefly on more targets, much more often than is presently the case in mission-oriented first- and second-phase reporting. As a result, IAS and the other departmental imagery analysis organizations will probably be tasked to provide imagery analysis on a more comprehensive basis which would take into account related targets, events, or activities of importance to their individual agencies or departments.

c. Describe Basic Features. This task has for the most part been taken over by the interagency program of basic reporting. We see the need for basic reporting dropping before the NRT era. Most of the important targets should have been treated in basic reports by that time, and updating may be accomplished without the issuance of a new hard-copy report.

d. Measure in Detail. This task goes beyond the normal mensuration provided in routine exploitation or analysis. It involves the precise, detailed measurement of structures, objects, or component parts which are of particular concern to an individual CIA requester. IAS receives photogrammetric support from NPIC on such tasks as well as having a significant in-house capability through the use of its own mensuration equipment on-line with the NPIC computer. This task, [] is expected to increase with improvements in the system, some of which are already occurring.

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e. Search. Most imagery searches presently conducted by IAS are relatively small-area searches associated with information from another source in the hands of our requester. Such tasks will probably increase in number when [] inputs begin to provide search coverage of improved scale and resolution over large areas. This need should level off or decline once a good photo base is established, probably before the NRT era.

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f. Illustrate. IAS is often asked to illustrate imagery-derived information of importance by means of an annotated photograph, vugraph, engineering drawing, sketch, or briefing board without a prepared text. This is a method by which the imagery analyst can visually communicate his findings for convenient use by other CIA components. This task, also frequently requested, can be expected to increase and will probably necessitate the development of faster and more varied methods of communicating pictorial information to key Agency officials as well as intelligence analysts.

g. Experiment with New Methods or Techniques. Imagery analysis experimentation now constitutes a relatively small portion of our direct support work in IAS. For CIA to realize the most gain from substantial investments in new collection systems, we must devote a greater effort to developing methods or techniques for applying imagery to the intelligence problems of our Agency customers.

h. Provide Consultation. This task is accomplished by a variety of means such as meetings with substantive specialists or consultants, face-to-face discussions at the analytical level, and--more and more--secure-line telephone communications. In the NRT era we expect the trend toward prompt answers being required with increasingly short notice to continue. Images will very likely be transmitted electronically for viewing and consultation on a near-real-time basis. As at present, great care will have to be taken by IAS management to insure that the interpretations being passed by imagery analysts via the consultation mechanism are adequately validated and correctly reflect the best judgment of IAS.

i. Provide Coverage Information. This is no longer a frequent request. Coverage information should be machine-retrievable in the NRT era.

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V. HOW SHOULD CIA MEET ITS DEPARTMENTAL NEEDS IN THE NRT ERA?

39. Careful consideration has been given to the methods by which CIA might seek to provide for its departmental needs. We have examined three alternatives dealing with the existence and management of CIA's departmental imagery analysis resources in an NRT environment.

Alternative A -- Have NPIC Absorb IAS Resources

40. From the NPIC point of view, this might be considered desirable. NPIC would acquire in one move roughly a hundred well-qualified imagery analysts. This is of some importance, since imagery analysis resources are scarce, and NRT will aggravate this scarcity. Absorbing IAS would cost NPIC nothing since IAS is already housed in [redacted] drawing upon the Center for a percentage of the basic services needed.

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41. The intelligence production offices of CIA would be the principal losers if IAS became a part of NPIC. With the time demands of NRT added to the volume pressures [redacted] a departmental unit within the NPIC structure would inevitably become submerged in the larger responsibilities of the Center, leaving insufficient resources available to answer departmental requirements. Before IAS became independent in February 1967, NPIC routinely borrowed IAS (then IAD) senior analysts during first-phase readout activities and applied their talents to the production of NPIC products. During these periods IAD's ability to perform its primary responsibility, timely and comprehensive departmental support to CIA, was very limited. If IAS were to become part of NPIC once more, there is good reason to expect that a substantial portion of the CIA departmental resources would again be drawn off to perform NPIC activities.

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42. Another serious problem would be the resultant loss to CIA of its independent point of view on the type of questions where IAS can now contribute a separate opinion. Undoubtedly a single opinion would be forthcoming from NPIC even in cases where different views might otherwise have been surfaced. This single opinion, whether or not in support of departmental requirements, would need to be acceptable to the CIA-DIA management structure which governs NPIC. Such a constraint would not represent the best interests of CIA.

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43. Both of the situations described above contributed to a working environment which CIA management found unacceptable in the past. This problem was solved when IAS was established as an independent organization early in 1967.

Alternative B -- Have the CIA Production Offices Absorb IAS Resources

44. Although IAS could conceivably be transferred as a unit to one of the production offices, this approach is considered impractical since advantages to that office would be gained only at the expense of other CIA consumers. During FY 1969 IAS provided imagery analysis services to a dozen different CIA components at the office and staff level, as well as meeting the preliminary assessment needs of the DDI and DCI and fulfilling the CIA commitment to the community for basic reporting. Because of these diverse needs within the Agency, it is essential that no single office be allowed to monopolize these services.

45. Distributing IAS resources among the production offices concerned has also been considered. In an NRT environment we think the production offices will require more departmental imagery analysis services than they presently do. Much more imagery will be available, and NPIC will be heavily tasked with carrying out its various common-service imagery analysis activities as well as performing a key role in interagency activities. The production offices of CIA are unable to provide their own imagery analysis now, and considering the nature of imagery analysis as presented in Section I of this report, we think that production office analysts neither can nor should be expected to double as imagery analysts in a near-real-time era. As to the possibility of solving this problem by giving each production office part of IAS' present resources, it would be very difficult to make an equitable distribution of these resources among the many offices and staffs, not to mention DDP. There are many substantive areas with which several offices are concerned, but there is a limited number of imagery analysts who are knowledgeable in each area. Such a move would also create serious problems with respect to the effective utilization and maintenance of specialized equipment, would hamper training and career development of imagery analysts, and would impede the interchange of information and ideas among imagery analysts separately assigned. It would interfere with the substantive review of output by qualified senior personnel, and hinder the maintenance of high professional standards. In short, it would seriously degrade the quality of the support now provided by IAS.

Alternative C -- Maintain an Independent IAS

46. Under this option IAS would remain an independent organization responding to CIA's needs for departmental imagery analysis. This alternative appears to offer the most effective and economical method of meeting these needs. In contrast to the alternatives previously examined, this would assure the Agency of an independent view, a second look, in-house support for sensitive or clandestine needs, and a prompt, flexible response to the individual needs of the intelligence production offices in an NRT environment of daily collection and exploitation.

Location of IAS

47. Having concluded that CIA should maintain an independent Imagery Analysis Service, we have given some consideration to the best location for IAS in the NRT era. In doing this, we have looked at the extent to which collocation is important to the various technical services provided to IAS by NPIC, including mensuration support, photo reproduction, printing, film vault, ADP, information services, and equipment maintenance. Of these, the only one which presently requires IAS present in [] is mensuration support. IAS must have access to computers to perform on-line mensuration with its own instruments. NPIC could continue to provide many of the other services to IAS at a distance as it now does for other external organizations such as DIA, FTD, and Navy in the Basic Exploitation Program.

48. We cannot be certain whether IAS will require the same types of supporting services in the NRT era. This will depend upon the requirements presented by such a system and upon technological developments in related fields in the next several years. Developments in the field of dry-process photo reproduction, for example, may make IAS less dependent upon the NPIC photo lab. This would be particularly true if this improved capability coincided with developments in the fields of data retrieval and electronic display of imagery, requiring less production of permanent photo materials. Likewise we anticipate the development of secure means for querying computers remotely, which should permit organizations located at a distance to use the NPIC computers for real-time mensuration support.

49. With all of these developments making IAS less dependent on physical proximity to NPIC, and to a degree more self-sufficient, we think that by the mid-1970's it would be feasible for IAS to terminate its collocation with NPIC if that turned out to be advantageous to CIA.

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In considering alternative locations for IAS, some among us feel that IAS and the production offices of CIA would work much more effectively together if they occupied a common location, while others here see no particular gain in being collocated with their counterparts in the production offices. The difference of opinion is related to the variety of subject matter with which our people deal: those working in scientific or technical areas of specialization believe the advantages to be gained from collocation of imagery analysts and intelligence production officers outweigh the disadvantages of separation from NPIC. Those working in non-technical and military fields, on the other hand, see more to be gained from continued collocation with their counterparts in NPIC.

50. The question of a future location for IAS can only be raised in a most preliminary way here. The resolution of such a question may depend largely on what course is taken with regard to the processing/exploitation center described briefly in the Inlow report. If there is to be a large multifunctional building to house all of the major elements involved in NRT processing/exploitation, then the improved environment of such a building, designed specifically to meet the needs of the NRT era, might well be the deciding factor.

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